Revere Standard Copper for building construction

REVERE

architectural specifications for roofs, gutters, valleys, flashings, cornices and other sheet metal work . . .

Revere Copper and Brass Incorporated

1949

the advantages of Revere Standard Copper for protecting structures of all types

durability • Copper is one of the least chemically active of commonly used commercial metals. This gives it high resistance to corrosion from air, water and acid solutions. If properly applied it affords insurance against costly repairs to building interiors and against exterior maintenance expense. Copper is therefore preferable to rustable metal.

economy • If properly applied, under ordinary conditions, the first cost of copper is its only cost. Initially, it will be slightly more expensive than rustable metal, but such slight increase in cost is trifling when compared with the total cost of the building. Extreme care in the manufacture of Revere copper, combined with the inherent properties of the metal, make the average cost of maintenance and repairs very low over long periods of time.

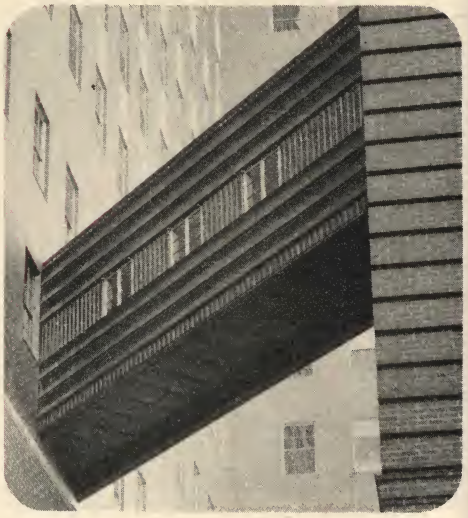
appearance • Nature acts as the decorator of copper. In time an attractive green coating known as "patina" is formed. This enhances the beauty of the structure and acts as a shield against deterioration. Copper gives dignity, character and beauty to any building.

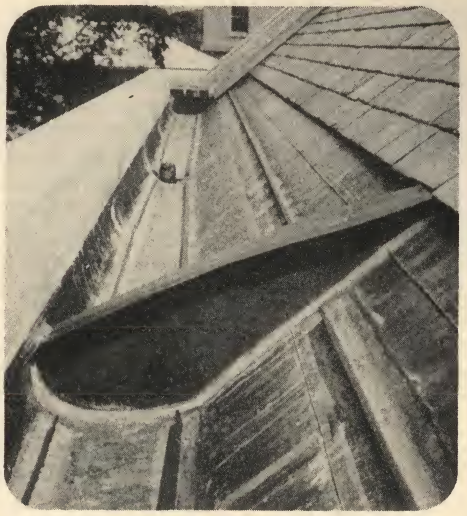
ease of application • Copper is one of the most ductile of metals. It is easily worked, thus making it an ideal metal for roofing sheets. It can be formed without difficulty to the contour of domes or cornices, or can be bent to form various types of seams.

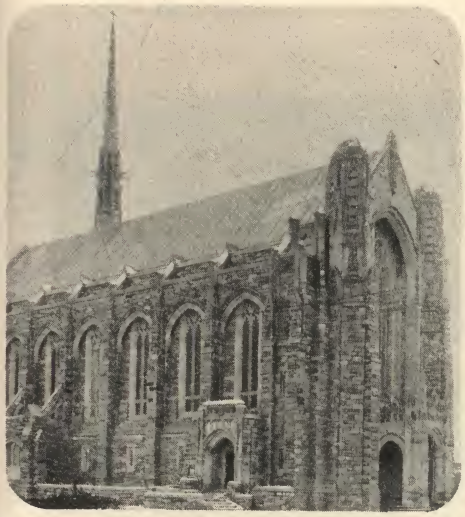
light weight • Copper's corrosion resistance makes it possible to use a relatively thin sheet. Copper makes one of the lightest of roofs — thereby reducing the weight of heavy supporting structures.

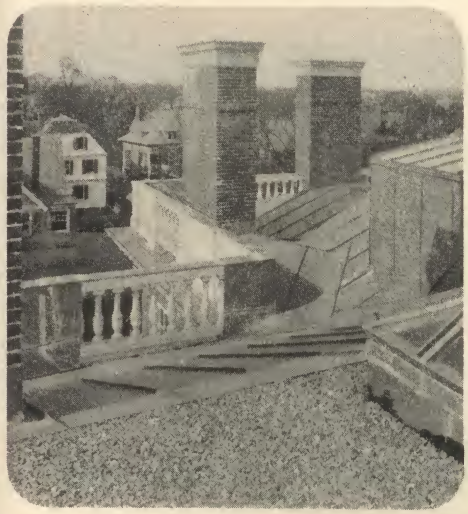
In the production of Revere Standard Copper, as well as in all Revere products, every precaution is taken to safeguard quality. Careful laboratory control and close inspection and testing during manufacture stand soundly behind the pre-eminent quality of Revere materials.

In this catalog will be found basic specifications for Revere Standard Sheet Copper for building construction.









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the development of engineered design:

to enable copper to withstand mechanical stresses

Copper, exposed to the elements, has proved through many decades to be the most enduring of all commonly used structural metals. Thus there has grown a belief that a copper covering, no matter how thin, should stand up unharmed by extreme thermal changes. Yet, in recent years, failures of sheet copper used for gutters, flashings and roofs have been reported. The metal is naturally blamed.

Revere is now able to report the real cause of such failures after comprehensive study of copper construction failures made in Revere Research Laboratories, Rome, N. Y. Copper gutters were used for testing purposes. The solution of gutter construction establishes fundamental principles for other sheet copper applications.

Gutters were installed under conditions simulating those to which actual installations are exposed. Tests showed, conclusively, that copper as a material is not at fault; rather that buckles are due to stresses set up by constant expansion and contraction of the metal -- in combination with insufficient columnar strength to absorb these stresses and hence prevent buckling.

The remedy is relatively simple. When sheet copper of proper shape and thickness, possessing sufficient rigidity, is specified, failures cease. At the right is a quick picture of the study made in Revere Research Laboratories. Full explanation is given in Revere's 96-page manual of sheet copper construction, "Copper and Common Sense." In this brochure, the how and why are made simple and clear with actual photographs, easy-to-use charts, dozens of full-page details. This manual has been sent to all recipients of Sweet's File Architectural. If you do not have a copy, Revere will be glad to send one to any architect, engineer or contractor upon request. See Revere addresses on back cover.

the tests

Replica models of both old and new gutter installations, 65 feet in length, were erected. These installations were submitted to hot and cold cycles with a temperature range of between 150 and 160 degrees. To provide radiant heat simulating that of the sun, 250-watt infra-red heating lamps were suspended over the entire length of the models. To provide cooling, the gutters were chilled with water from a nearby river. This water was "rained" on the copper surfaces. The complete cycle, taking 6 minutes, approximated a year's exposure to the weather. These accelerated tests made it possible to duplicate, in a relatively short time, conditions produced by nature over an extended period of years. In individual tests, the gauges of the copper ranged from 16 oz. soft copper (generally specified in the past for roofing and sheet metal construction) to 32 oz. cold rolled copper.

heating copper gutter to cause expansion

cooling the gutter to cause contraction

the results

The annual effects of nature are reproduced in a few minutes. Failure is witnessed step by step. The cause becomes obvious: lack of strength to withstand stresses set up by contraction and expansion. Because of the excessive distance between expansion joints, the copper section did not possess sufficient strength to transfer the movement to the expansion joint. The tests likewise disproved the belief that expansion joints alone can prevent buckling. It was found that three factors must be considered to obtain long life and trouble free service: (1) weight and temper of copper; (2) design and distribution of expansion joints; (3) efficiency of transverse joints.

For similar shape and gauge, cold rolled copper supports a greater compressive load than soft copper and provides increased columnar rigidity. Therefore, cold rolled copper can transfer accumulated movement much greater distances before pinching. This increased rigidity reduces the number of expansion joints required with soft copper.

effect of first heat on 16 oz. soft copper

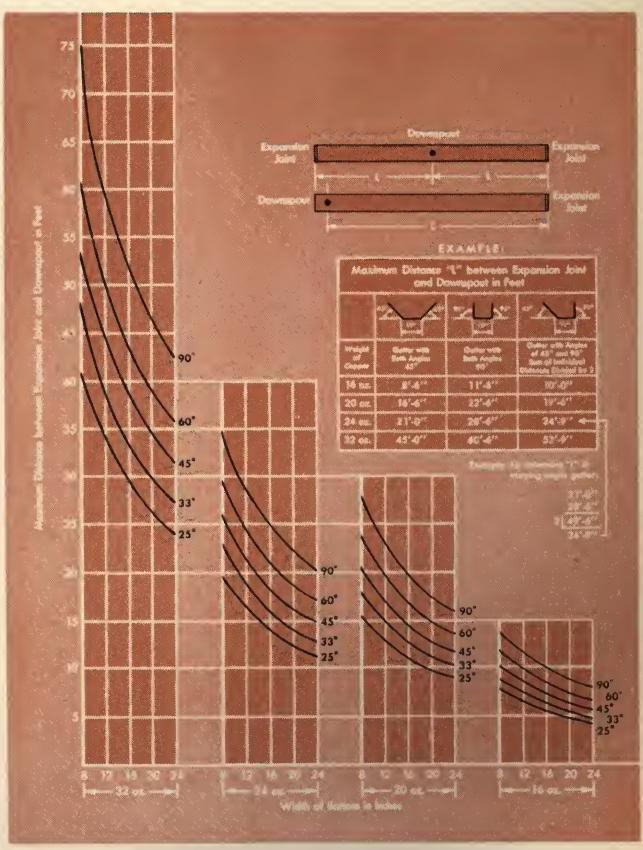
the same copper gutter after 12 cycles

the solution

With data acquired in these tests, Revere engineers evaluated, on strength testing machines, the ability of various shapes, gauges and tempers to resist compression — to produce columnar rigidity. It was clearly noted that cold rolled copper is more resistant than soft copper; that the heavier gauges increase rigidity. A formula for the safe critical load of a copper gutter section was developed.

Applying this formula to various gauges, angles, and gutter bottom dimensions, the chart below was prepared. To use this chart, the three factors involved in gutter design must be considered: width of bottom; angles of sides; effective restraint of gutter ends. It is apparent from this chart that the maximum safe distance between expansion joint and other fixed point is least with light gauge copper: greatest with heavy gauge copper. Full explanation is found in Revere's manual of sheet copper construction.

determination of gauge and expansion joint locations for various sizes and shapes of copper gutter linings.



specifications for copper roofing and sheet metal work

• *On the following pages are given complete specifications for the principal construction uses of Revere Standard Copper. With each of these, the specifications on materials and workmanship (below) are to be used. Specifications for other construction applications of Revere Copper (such as fascia gravel stops, eave flashing, louvres) will be gladly furnished on request.*

Detail drawings used on the following pages are taken from the new Revere brochure, "Copper and Common Sense", and are approximately one-quarter the size of those in the brochure.

materials

sheet copper • Shall be Revere Standard Copper for building construction, or equivalent. Where cold rolled copper is specified, it shall be cornice temper and where soft copper is specified, it shall be hot rolled or roofing temper. Any sheet metal shown on the drawings and not otherwise specified shall be 16 ounce cold rolled copper. The copper sheet shall be rolled from copper fulfilling the requirements of A.S.T.M. specification B 5. The finished sheets shall conform to A.S.T.M. specification B 152.

lead coating* • Where lead coated copper is specified or noted on drawings, the copper shall be coated on both sides with lead weighing not less than 7½ pounds per 100 square feet for each side. The lead coating shall be applied by the hot dip process. The weights of lead coated copper specified shall be the weights of the sheet copper exclusive of the lead coating. All lead coated copper shall have a finish not rougher than Leadtex 15.

tolerance in thickness • Sheet copper, exclusive of lead coating, shall be not less than the following thicknesses:

nominal weight, oz.	*nominal thickness, in.*	*minimum thickness, in.*
10	.0135	.012
16	.0216	.019
20	.0270	.0245
24	.0323	.030
32	.0431	.0405

nails used for fastening copper • Shall be hard copper barbed nails with large flat heads and with the barbs extending at least half the length of the nail. They shall be not smaller than No. 12 Stubs gauge (0.109 inch) and of sufficient length to penetrate the roof boarding not less than ⅞ inch.

screws, bolts and other accessories used for fastening copper • Shall be copper, bronze or brass.

expansion shields • Shall be lead, bronze or equal non-ferrous alloy.

cleats • Shall be 2 inches wide by about 3 inches long and shall be made of 16 ounce cold rolled copper, unless otherwise specified. One end shall be locked into the seam or into the folded edge of the copper sheets. The other end shall be nailed with two nails and folded back over the nail heads.

solder • Shall be composed of 50 per cent pig lead and 50 per cent block tin where used on plain copper. Where used on lead coated copper, the composition shall be 40 per cent lead and 60 per cent block tin.

flux • Muriatic acid killed with zinc, or an approved brand of soldering paste, shall be used as a flux. Acid shall be thoroughly washed off after soldering is completed.

elastic cement • Shall be a mixture of asphalt and asbestos fibres, fulfilling the requirements of Federal specification SS-C153.

roofing felt • shall be saturated with asphalt or pitch and shall weigh 14 to 15 pounds per 108 square feet.

rosin sized paper • Shall be a smooth, unsaturated building paper weighing approximately 6 pounds per 100 square feet.

workmanship

surfaces to be covered with sheet metal • Shall be free from defects of every description. All such surfaces shall be cleaned of dirt, rubbish and other foreign materials before the sheet metal work is started. All projecting nails shall be driven flush with the roof boarding.

tinning • The edges of all sheets of uncoated copper to be soldered shall be tinned on both sides for a width of not less than 1½ inches. No tinning is required on lead coated copper, but the lead in contact with solder shall be thoroughly wire brushed to produce a bright surface.

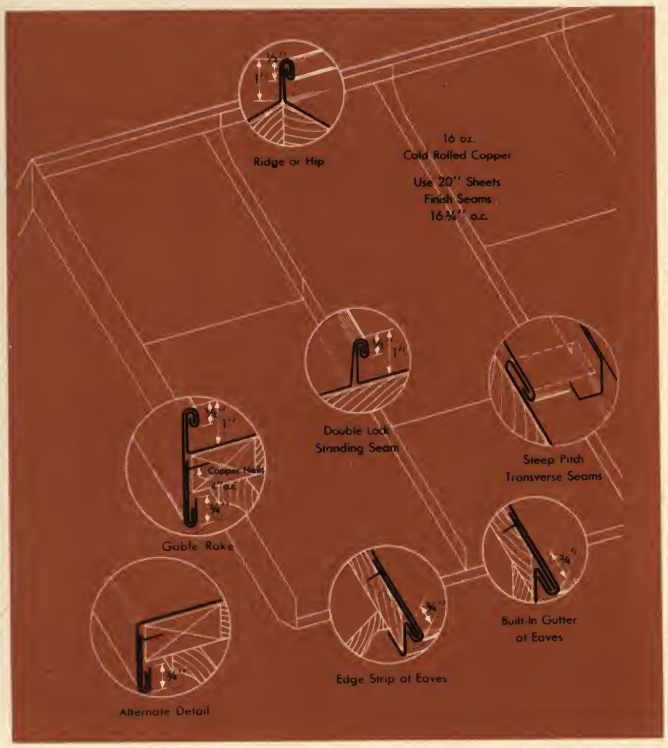
soldering • Shall be done slowly with well heated coppers, so as to thoroughly heat the sheet and completely sweat the solder through the full width of the seam. Ample solder shall be used and the seam shall show at least one full inch of evenly flowed solder. Seams on a slope steeper than 45 degrees shall be soldered a second time, rubbing the seams firmly with well heated coppers. When soldering lead coated copper, a liberal amount of flux shall be brushed into the seam.

soldering coppers • Soldering shall be done with heavy soldering coppers of blunt design, properly tinned before using. For flat seam work, gutters and for all lead coated copper, they shall weigh not less than 10 pounds per pair and for other work they shall weigh not less than 6 pounds per pair.

cross folded loose seams • Where copper is folded in one direction and then folded at right angles to the first fold, as for example the slip joints of base flashings, expansion joints and similar cross folded joints, the folded portion of the copper at the cross fold shall be slit and a patch of copper shall be soldered over the slit to avoid binding at the cross fold.

**Owing to the acute shortage of lead, it is advisable to consult the nearest Revere office before specifying lead coated copper (Revere Leadtex).*

standing seam roofing



paper • The roofing surfaces shall be covered with roofing felt and over this apply rosin sized paper. Each ply shall lap not less than 2 inches in the direction of flow and shall be nailed with copper nails driven through sheet copper washers not less than ½ inch square. Nails in the roofing felt shall be spaced not more than 3 inches apart on all lapped seams. Nails in the rosin sized paper shall be spaced 18 inches apart in both directions.

pan method • The pan method may be used on roofs with slopes of 6 inches to the foot or steeper. The roofing pans shall be formed of 20 x 48 inch 16 ounce cold rolled copper sheets bent up 1½ inches at one edge and 1¾ inches at the opposite edge with loose locked seams at the upper and lower edges. The cross seams shall be formed with a ¾ inch fold on the lower end of the upper pan and with a 2 inch fold on the upper end of the underlying pan. The transverse seams shall be slitted to avoid cross folded seams where they turn up at the standing seams. The slit in the fold at the lower end of the upper pan shall be 1 inch away from the standing seam. Edge of slit in the lower fold at the upper end of the lower pan shall be soldered to the vertical leg of the standing seam. Alternate pans shall begin at the eaves with half length sheets, thus staggering the transverse seams. Cleats shall be spaced 12 inches on centers on each standing seam and there shall be one cleat at the center of each transverse seam.

roll method • Cold rolled 16 ounce copper sheets, 20 x 48 inches in size, shall be double locked together to form a strip 20 inches wide by a length equal to the length of the roof slope. Standing seams shall be formed at the job with roofing tongs. Connections to gutter or eaves flashings shall be loose locked, unsoldered seams. Cross seams shall be staggered. Cleats shall be spaced 12 inches on centers on each standing seam.

standing seams • Shall finish 1 inch high, except on curved roof surfaces where they shall finish ½ inch high. The first fold shall be a single fold ¼ inch wide and the second fold shall be a double fold ½ inch wide. The locked portion of the standing seam shall be 5 plies in thickness. Lower ends on standing seams shall be folded over at an angle of about 45 degrees or turned down in a tapered fold.

Spacing of standing seams should be 16¾ or 20¾ inches to use 20 or 24 inch widths of copper sheets without waste. If 24 inch widths are used, the copper should be 20 ounce instead of 16 ounce, and the size of the copper sheets should be 24 x 48 inches instead of 20 x 48 inches.

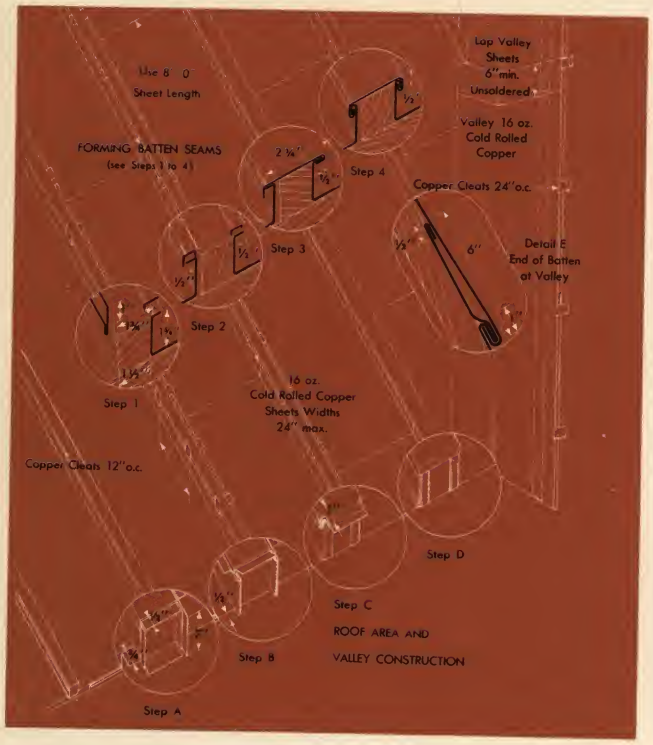
ridges and hips • Shall be provided with standing seams constructed as specified for the standing seams on the main roof.

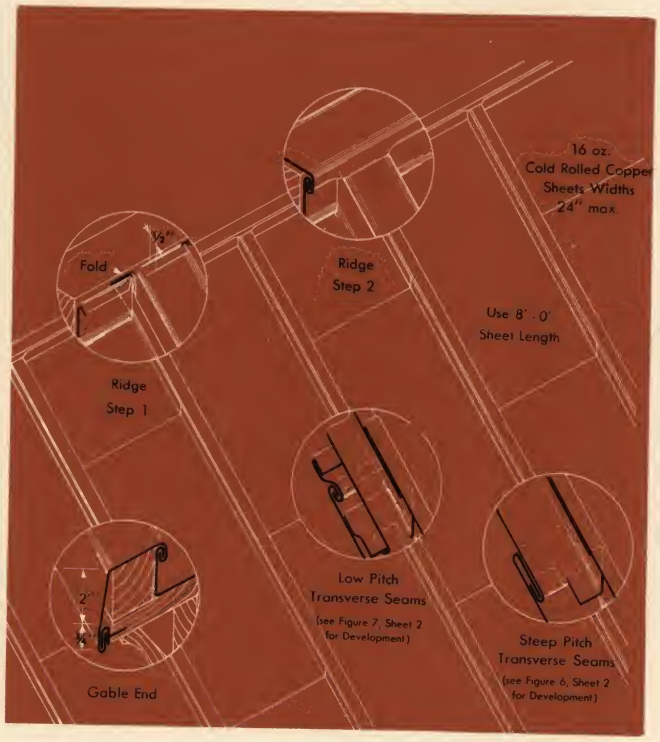
valleys • Valley sheets shall be 16 ounce cold rolled copper not exceeding 8 feet in length. Each sheet shall lap the lower sheet not less than 6 inches in the direction of flow. The valley sheet shall extend under the roofing sheets on both sides not less than 6 inches. At the valley line adjacent to the lower edge of the roofing sheets, a ¾ inch double fold shall be made to engage a ¾ inch single fold at the lower ends of the roofing sheets. The outer edges of the valley sheets shall be folded ½ inch for cleating and in these folds copper cleats shall be installed on 18 inch centers.

eaves • At the eaves, where no gutters occur, each pan shall be hooked over a previously placed 24 ounce cold rolled copper edge strip. Edge strips shall be formed from sheets not more than 8 feet long and each length shall lap 1 inch over the preceding one. The edge strips shall be attached with copper nails spaced 4 inches apart. Where gutters occur at the eaves, the pans shall be loose locked into the gutter lock strip.

gable rakes • The pans against the gable rakes shall turn up vertically 1½ inches and shall be locked into a 16 ounce cold rolled copper fascia strip forming a standing seam 1 inch high. A continuous edge strip of 24 ounce cold rolled copper shall be attached to the edge of the roof boarding with copper nails spaced 4 inches apart. The lower edge of the fascia strip shall be hooked over the edge strip.

batten seam roofing


Use 8' 0" Sheet Length
Lap Valley Sheets 6" min. Unsoldered
Valley 16 oz. Cold Rolled Copper
FORMING BATTEN SEAMS (see Steps 1 to 4)
Step 4
Copper Cleats 24" o.c.
Step 3
Detail E End of Batten at Valley
Step 2
Step 1
16 oz. Cold Rolled Copper Sheets Widths 24" max.
Copper Cleats 12" o.c.
Step D
Step C
ROOF AREA AND VALLEY CONSTRUCTION
Step B
Step A


16 oz. Cold Rolled Copper Sheets Widths 24" max.
Fold
Ridge Step 2
Use 8' - 0" Sheet Length
Ridge Step 1
Low Pitch Transverse Seams
(see Figure 7, Sheet 2 for Development)
Steep Pitch Transverse Seams
(see Figure 6, Sheet 2 for Development)
Gable End

battens • Of size and spacing shown on the drawings, will be furnished and installed under the Carpentry section of the specifications.

Battens shall be 1¾ inches wide at the top, 1⅝ inches wide at the bottom and 1⅝ inches high except where otherwise shown or specified. Spacing should be 17½ or 21½ inches on centers to use 20 or 24 inch width copper sheets without waste. Battens shall be attached to concrete roof deck by through bolts or expansion bolts of the cinch type, and to gypsum decks by through bolts spaced not more than 3 feet 6 inches on centers.

paper • Before installation of battens by the carpenter, the roofer shall cover all surfaces with roofing felt laid with 2 inch laps and nailed with copper nails driven through sheet copper washers not less than ½ inch square. Rosin sized paper shall be applied over the roofing felt, between the battens, immediately preceding the application of the copper roofing.

copper pans, formed of 16 ounce cold rolled copper • Shall be installed between the wood battens. The pans shall be made from sheets 8 feet long, except the starting pans in alternate courses shall be 4 feet long at the eaves, thus staggering the transverse seams. Sides of the sheet shall turn up to the height of the battens plus ½ inch with the ½ inch folded to form a horizontal flange at top edge of the battens. *If pans are formed from sheets over 24 inches wide, 20 ounce cold rolled copper should be used instead of 16 ounce.*

for roof slopes of 6 inches or more to the foot • Cross seams shall be formed with a ¾ inch fold on the lower end of the upper pan and with a 2 inch fold on the upper end of the underlying pan. The folds in the cross seams shall be slitted at each corner of the pan to avoid a cross folded seam. The slit in the fold at the lower end of the upper pan shall be 1 inch away from the batten. Edge of slit in the fold at the upper end of the lower pan shall be soldered to the vertical leg of the pan.

for roof slopes of 3 to 6 inches to the foot • Cross seams shall be formed with a ¾ inch fold, in the direction of flow, in both the upper and lower pans. A 16 ounce copper lock strip 1½ inches wide shall be soldered to the underlying pan and shall turn up on each vertical leg of the pan to a height of 1¼ inches. The lower edge of the lock strip shall be 3 inches below the upper edge of the pan. The ¾ inch fold in the lower end of the upper pan shall hook into the lock strip.

cleats • Shall be spaced not more than 12 inches on centers on each vertical side of all battens and there shall be one cleat at the center of each transverse seam. Batten cleats must be nailed to the vertical sides of the battens.

cover strips, formed of 16 ounce cold rolled copper • Shall be applied over the battens. Edges of cover strips shall lock into the ½ inch horizontal flanges of the pans and shall then be malleted down against the vertical sides of the battens. Batten ends shall be covered with a copper cap folded and locked into tabs ½ inch long on the top and two vertical sides of the cap. The tabs shall be ½ inch extensions of the cover strip and vertical legs of pans.

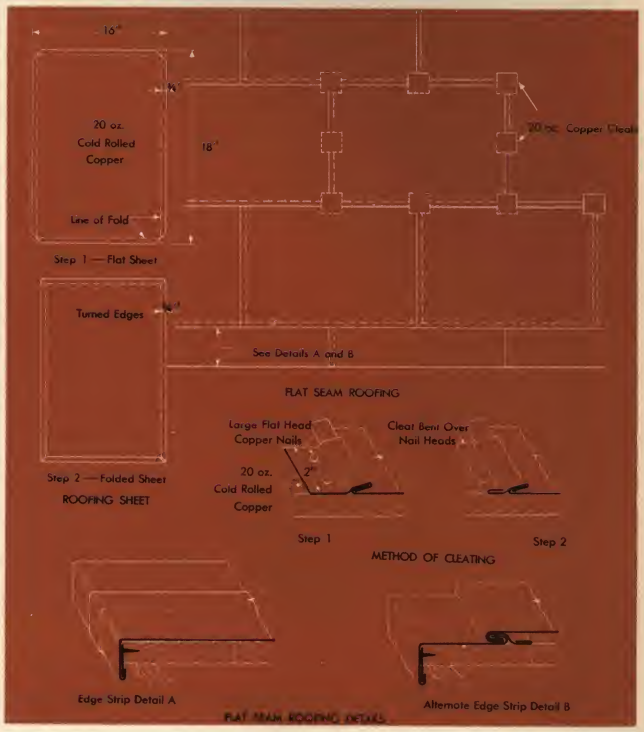
hips and ridges • Shall be covered with copper covered battens similar to the roof battens. At the intersection of the roof slope with the ridge or hip battens, the edges of the roof pans shall be turned up against the ridge or hip battens, and terminate in a ½ inch horizontal flange at the top of the battens. Cover strips, as specified for the roof battens, shall be installed over the top of the hip and ridge battens, shall be locked into the flanges of the pans and malleted down over the tops of the intersecting roof battens.

valleys • Valley sheets shall be 16 ounce cold rolled copper not exceeding 8 feet in length. Each sheet shall lap the lower sheet not less than 6 inches in the direction of the flow. The valley sheet should be of sufficient width so that a 1 inch double fold can be made along both edges at a distance from the center bend to provide the proper valley width. The edges of the copper roofing sheets hook into this fold to form a loose lock. The valley sheet shall extend under the roofing sheets on both sides not less than 6 inches and each edge shall be folded ½ inch for cleating. Copper cleats shall be installed in these folds on 24 inch centers. The under edge of the wood battens shall be notched to permit the folded edge of the valley sheet to pass under the batten.

eaves • At the eaves, where no gutters occur, each pan shall be hooked over a previously placed 24 ounce cold rolled copper edge strip. Edge strips shall be formed from sheets not more than 8 feet long and each length shall lap 1 inch over the preceding one. The edge strips shall be attached with copper nails spaced 4 inches apart. Where gutters occur at the eaves, the pans shall be loose locked into the gutter lock strip.

gable rakes • There shall be a roof batten set flush with the gable end. The cover strip on this batten shall lock into the roof pan, shall cover the top of the batten and extend down over the face of the batten where it shall be locked into a previously placed 24 ounce cold rolled copper edge strip as specified for edge strips at eaves.

flat seam roofing



paper • The roofing surfaces shall be covered with roofing felt with seams lapped 2 inches and nailed with copper nails driven through sheet copper washers not less than ½ inch square.

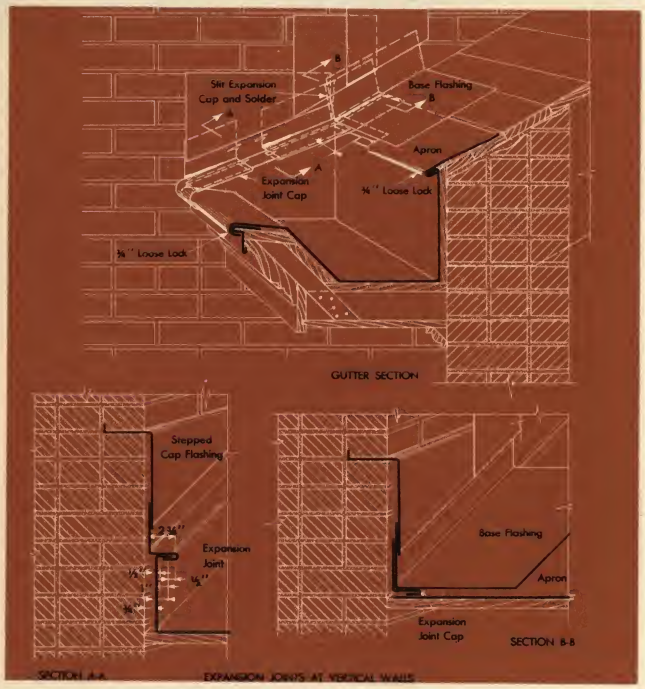
roofing sheets • Shall be 20 ounce cold rolled copper not larger than 16 x 18 inches, laid in courses parallel with the eaves and with the shorter dimension of the sheet at right angles to the course. Cross joints shall be staggered. Edges of sheet shall be pretinned and shall be bent to form ¾ inch locked and soldered seams. Corners shall be notched.

cleats • Shall be formed of 20 ounce cold rolled copper. There shall be two cleats on the longitudinal seam and two on the transverse seam of each pan.

flashings • At the intersection of roof surfaces with masonry walls, the roofing copper shall be turned up on said walls at least 6 inches to form base flashings. Thru-wall and cap flashings shall be provided at these locations.

eaves • At eaves, also at rakes which do not abut vertical surfaces, the roofing sheet shall hook over a previously placed continuous 24 ounce cold rolled copper edge strip. The edge strip shall be attached with nails spaced 4 inches apart.

soldering • All seams shall be thoroughly soldered, producing watertight joints.



paper • The supporting surfaces under copper gutter linings shall be covered with roofing felt and over this a ply of rosin sized building paper shall be installed.

gutter lining • Shall be formed of (32 ounce)* cold rolled sheets conforming closely to the profile of the gutter. There shall be no longitudinal seams and the cross seams shall be 36 inches apart if the sectional contour of the gutter is more than 36 inches. If the sectional contour is 36 inches or less, the gutter lining may be formed of copper sheets 8 feet in length. Gutter linings constructed of 16 to 20 ounce copper shall have the ends joined together by ¾ inch lock and soldered cross seams. For linings heavier than 20 ounces, the ends shall be joined together by 1½ inch lapped, riveted and soldered cross seams. Rivets shall be copper 3/16 inch in diameter with copper burrs and spaced not more than 2 inches on centers.

hold down • If the sectional contour of the gutter is more than 24 inches, the lining shall be held down by brass screws covered with 16 ounce copper cups soldered to the gutter lining. The screws shall be spaced not more than 36 inches apart longitudinally and not more than 12 inches apart transversely. Screws shall be No. 12 x ⅞ inch round head brass screws where used in wood, and similar screws with expansion shields where used in stone. A brass washer, 1/16 inch thick by 1¼ inches in diameter, shall be provided under each screw head. Hole in gutter lining shall be ¾ inch in diameter and the screw shall be at the center of this hole, except that the holes opposite each outlet tube shall be the same size as the screws to provide anchorage to the gutter lining at these locations.

connection to copper roofing • The roof edge of the gutter lining shall extend under the copper roofing not less than 6 inches and terminate in a folded edge where it shall be attached to roof boarding by copper cleats spaced 24 inches on centers. A continuous cold rolled copper lock strip, of same thickness as the gutter lining, shall be continuously soldered to the gutter lining at the lower ends of the copper roofing sheets and the roofing copper shall connect to this lock strip with a loose lock.

connection to slate, tile or shingle roofing • The roof edge of the gutter lining shall extend under the slate (tile or shingles) not less than 6 inches and terminate in a folded edge. A separate apron strip, not less than 6 inches wide and formed of 16 ounce cold rolled copper, shall be loose locked into the folded edge of the gutter lining. The upper edge of this apron shall be nailed to the roof boarding with copper nails spaced 4 inches apart. The roofing nails shall not pierce the gutter lining.

cant strip, formed of 16 ounce cold rolled copper • Shall be tack soldered to the gutter lining at intervals of 6 inches on each side of the cant strip. The cant strip shall be formed from a strip of copper 2 inches wide and with a raised V, or ridge, at the center ½ inch high.

outlet tubes • Shall be formed of 32 ounce cold rolled copper, with a lock and soldered longitudinal seam. The upper end of the tube shall be flanged, riveted and soldered to the gutter lining. The tube shall extend into the conductor at least 3 inches.

strainers • Shall be provided at all outlet tubes. They shall be wire basket type formed of no. 14 B & S gauge copper wire, or cast bronze, and shall fit snugly in the outlet tube.

expansion joints • Shall be provided midway between all outlet tubes, also where the ends of gutters abut masonry walls. The ends of each gutter section shall be closed with 16 ounce cold rolled copper, flanged, riveted and soldered to the gutter lining. The top edge of the gutter ends shall have a horizontal flange 1½ inches wide for connection to the expansion joint cover strip. The expansion joint shall have an open space 1 inch wide between adjacent gutter ends or between a gutter end and adjacent wall. A cover strip, formed of 16 ounce cold rolled copper, shall be provided over the expansion joint and shall be loose locked into the horizontal flanges at the top of the gutter ends. The loose lock joints shall provide for a movement of the gutter lining of ½ inch in either direction. Where the ends of the gutter abut a masonry wall, the cover strip shall extend under a

** The thickness of copper gutter lining depends upon the size and shape of the gutter, and the distance between downspouts and expansion points. This thickness should be determined from the chart shown on page 28 of the Revere manual of sheet copper construction by Revere (see page 4).*

counter flashing built into the masonry. Ends of cover strips shall terminate in a manner to provide watertight connections and to permit freedom of movement of the gutter lining.

gutters at high parapets • The outer edge of gutter linings shall extend under cap flashing not less than 3 inches. The roof edge of the gutter lining shall be at least 4 inches higher than the top of the parapet.

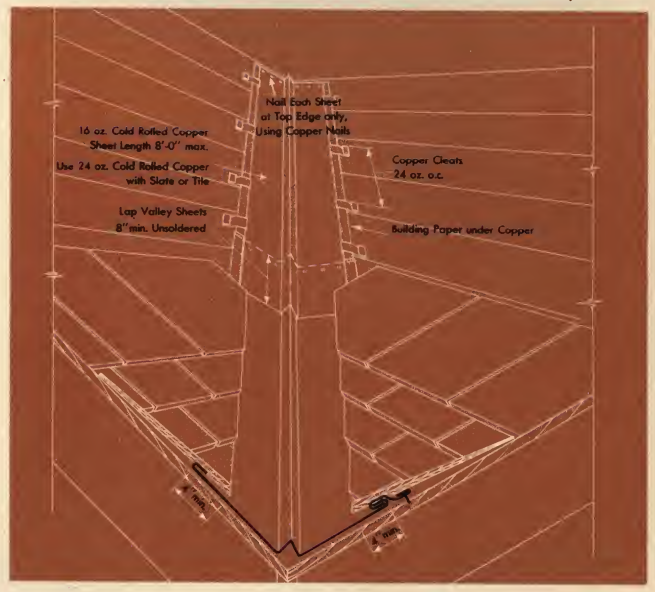
gutters at low parapets or cornices • The outer edge of the gutter linings shall extend over the top of cornice or low parapet and shall be folded into a previously placed 32 ounce cold rolled copper edge strip. The edge strip shall be attached to wood construction with copper nails spaced 4 inches apart, and to stone with brass screws and expansion shields spaced 12 inches apart. The roof edge of the gutter lining shall be not less than 4 inches higher than the outer edge of the gutter.

molded gutters, forming combination cornice and gutter • Shall conform to the size and design shown on the drawings. They shall be constructed of 20 ounce cold rolled, lead coated* copper and the outer edge shall be folded over a 1 x ¼ inch red brass, or copper, stiffening bar. The roof edge shall extend under slate, tile or shingles not less than 6 inches, or shall be loose locked to copper roofing sheets, and shall be attached to roof boarding with copper cleats spaced 12 inches on centers. Transverse braces, formed from 20 ounce cold rolled copper strips 2 inches wide bent to form a channel 1 inch wide and with ½ inch flanges, shall be attached to the top edges of the gutters and shall be spaced 36 inches on centers. There shall be no longitudinal joints. Cross joints shall be lapped 1½ inches, riveted with copper rivets spaced 2 inches apart and soldered. Provision shall be made for expansion and contraction as specified for Gutter Linings.

hung gutters, or eaves troughs • Shall be constructed of 16 ounce cold rolled, lead coated* copper in sections approximately 8 feet long, joined by tongue and grooved slip joints and supported by copper or brass hangers spaced not more than 36 inches apart. There shall be a rolled bead on each side of the gutter. Hangers shall be formed of 1 x ⅛ inch copper, or red brass, bars extending 6 inches on the roof boarding and attached to same with two countersunk brass screws. A hanger strip of 32 ounce cold rolled copper 1 inch wide shall be installed across the top of the gutter with ends folded into the bead on each side of the gutter and bolted to the brass hanger bar with a ⅜ inch brass stove bolt. The grooves of slip joints shall be filled with a thick mixture of white lead paste. End pieces, miters and outlets shall be provided where required, all of which shall be 16 ounce lead coated* copper, soldered and made watertight. Width of hung gutters shall be 5 inches unless otherwise shown or specified.

** Delete "lead-coated" if plain copper is desired.*

valleys


Nail Each Sheet at Top Edge only, Using Copper Nails
16 oz. Cold Rolled Copper Sheet Length 8'-0" max.
Use 24 oz. Cold Rolled Copper with Slate or Tile
Copper Cleats 24 oz. o.c.
Lap Valley Sheets 8" min. Unsoldered
Building Paper under Copper

usual slopes • Valley flashings shall be cold rolled copper in lengths not exceeding 8 feet. Where used with wood or asphalt shingles, the copper shall weigh 16 ounces per square foot and where used with slate or tile roofing the copper shall weigh 24 ounces per square foot. The open portion of the valley shall be 5 inches wide at the top and shall increase in width ⅛ inch per foot toward the eaves. The copper shall extend not less than 4 inches under the shingles on each side of the valley and the edges shall be folded ½ inch for cleating. The sheets shall lap 6 inches in the direction of flow and the upper end of each sheet shall be nailed to the roof boarding. Edges shall be secured with copper cleats spaced 24 inches on centers.

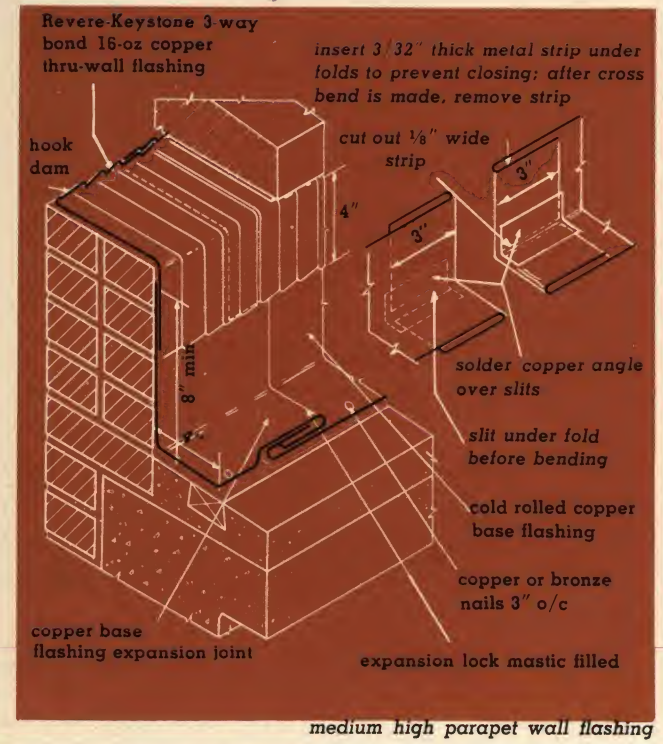
flat slopes • If the slope of the valley is less than 4¼ inches per foot, or if the intersecting roofs are on different slopes, a V joint 1 inch high shall be provided along the center line of the valley and the lap of the valley sheets shall be increased to 8 inches.

leaders

Leaders, or downspouts, shall be constructed of 16 ounce cold rolled, lead coated* copper in 8 or 10 foot lengths where possible. End joints shall telescope 1½ inches and longitudinal joints shall be locked. The work shall include all necessary elbows, offsets, etc., as required. Leaders shall be rectangular, corrugated and of dimensions shown.

leader heads • Shall be constructed of 16 ounce cold rolled, lead coated* copper of design and dimensions shown.

leader straps, spaced not more than 10 feet apart and formed of 16 ounce cold rolled, lead coated* copper • Shall be provided for attaching leaders to the building.


Revere-Keystone 3-way bond 16-oz copper thru-wall flashing
insert 3/32" thick metal strip under folds to prevent closing; after cross bend is made, remove strip
hook dam
cut out 1/8" wide strip
3"
4"
3"
8" min
solder copper angle over slits
slit under fold before bending
cold rolled copper base flashing
copper or bronze nails 3" o/c
copper base flashing expansion joint
expansion lock mastic filled

medium high parapet wall flashing

thru-wall flashing

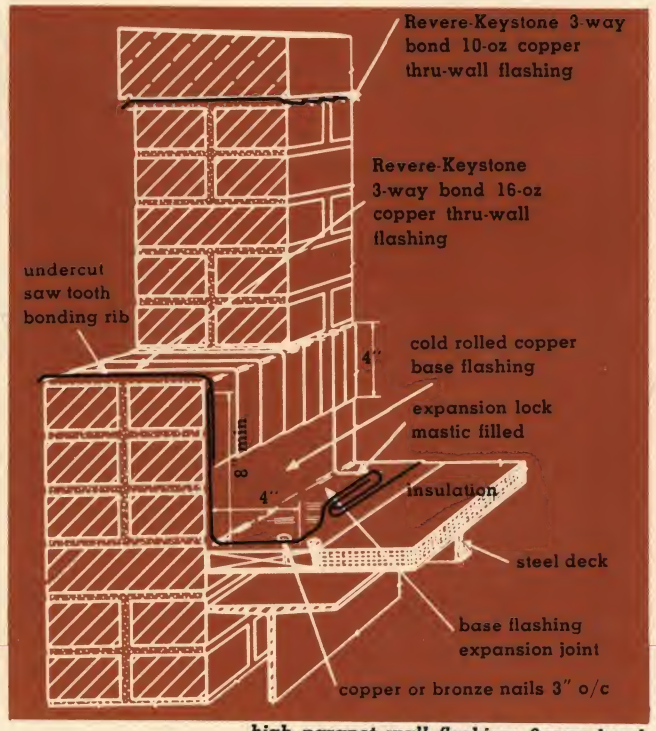
where required • Thru-wall flashing shall be installed in masonry walls or parapets to form cap flashing for connecting to the following items of copper work:

(a) base flashings on built-up roofs and on flat seam copper roofs
(b) built-in gutters
(c) copper cornices or copper covering over wood or stone cornices and belt courses

Thru-wall flashing shall also be installed directly under all stone copings.

design • Thru-wall flashing shall be formed from not less than 16 ounce soft copper. It shall be of width equal to the thickness of the wall plus 4 inches to form a cap flashing. The copper shall be embossed in a manner to provide a mechanical bond in any horizontal direction and to prevent lateral movement. The embossing shall be of a design that will prevent the formation of water pockets.

installation • Thru-wall flashing shall be laid in the wall by the mason with a thin layer of mortar above and below the flashing. The total thickness of the two layers of mortar and the flashing shall equal a regular mortar joint. Ends of thru-wall flashings shall lap in a manner to provide a watertight lap joint.

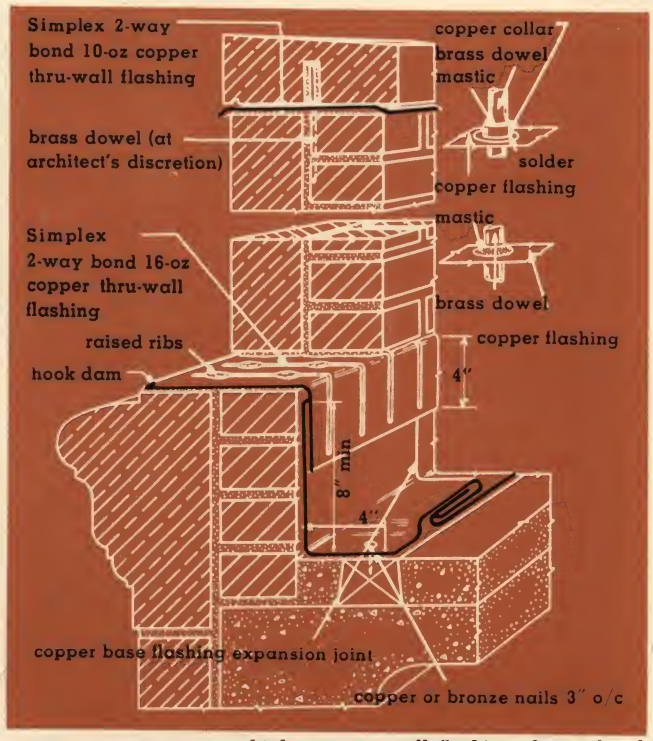


high parapet wall flashing: 3-way bond

counter, base and cap flashings

counter flashings • Shall be installed in masonry walls in conjunction with base flashings where it is impractical to use thru-wall flashings, such as chimneys, vent shafts, intersection of pitch roofs with vertical masonry surfaces, etc. Counter flashings shall be formed of 16 ounce soft copper in lengths of 8 feet, except where shorter lengths are required. The flashings shall extend into the masonry 4 inches and terminate with a ¼ inch folded edge. They shall extend down over and lap the base flashing at least 3 inches. At the intersection of pitched roofs with vertical masonry surfaces, the counter flashing shall be installed in steps, each step to overlap the underlying step by at least 3 inches.

base flashings • Shall be formed of 20 ounce cold rolled copper using sheets 8 feet long, except where shorter lengths are required. Base flashings on built-up roofing shall extend up on the walls to within 1 inch from the thru-wall or counter flashing, except where otherwise shown or specified, and out on the roof not less than 4 inches. Straight runs of base flashings shall be made up in units approximately 24 feet long. These units shall be connected together with a 3 inch loose lock slip joint filled with elastic cement.



high parapet wall flashing: 2-way bond

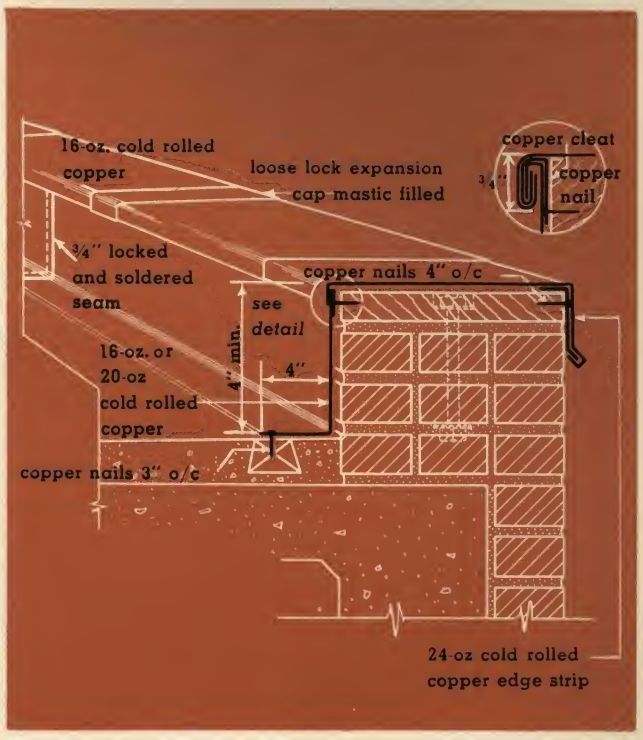
Straight runs less than 24 feet long shall have a similar slip joint at the center of the run. There shall also be a similar slip joint not more than 8 feet from any external or internal corner of the roof. Joints between slip joints shall be ¾ inch lock and soldered seams. All slip joints shall be made as heretofore specified under Cross Folded Loose Seams. The portion of the copper in contact with built-up roofing shall be given a coat of asphaltum paint before the flashing is set in place. The outer edge of the base flashing on built-up roofs shall be held in place by copper nails spaced 3 inches on centers.

Base flashings for shingles, slate, tile, etc., shall be built in with each course of the roofing material, shall lap over the underlying flashing at least 3 inches and shall extend up under the counter flashing at least 3 inches.

general • Parapets shall be covered with copper as shown on the drawings.

edge strip • A cold rolled copper edge strip shall be attached to each edge of the parapet if the base flashing does not extend to top of parapet. On low parapets where the base flashing extends to top of coping, the edge strip is required only on the outer

coping covering



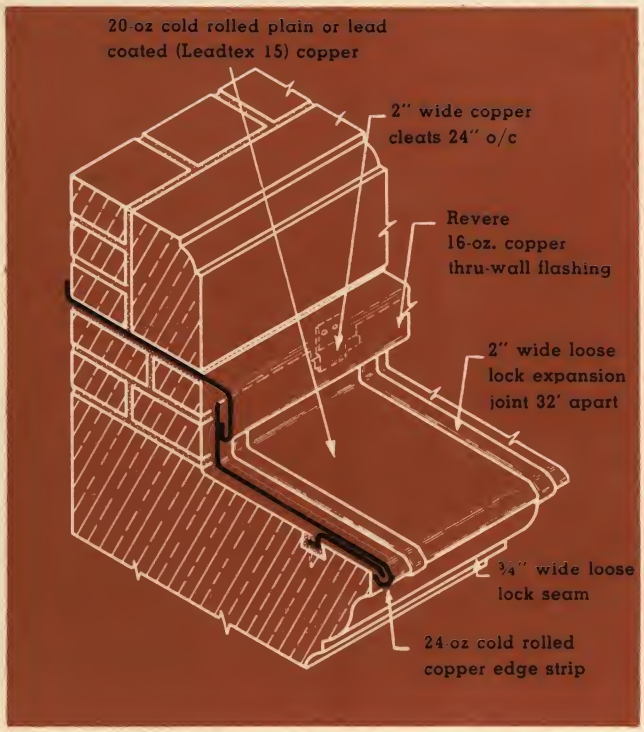
edge of the parapet. On wood covered copings the edge strip shall be 24 ounce copper and shall be attached with copper nails spaced 4 inches apart. On stone copings, the edge strip shall be 32 ounce copper and shall be fastened with brass screws in expansion shields spaced 12 inches on centers.

flat sheet coping covering • Shall be 16 ounce cold rolled copper with ¾ inch locked and soldered cross seams, except there shall be a loose lock expansion cap, filled with elastic cement, at intervals of not more than 32 feet. The front edge of the copper shall extend down over and lock into the edge strip.

standing seam coping covering • Shall be 16 ounce cold rolled copper with standing seams transverse with parapet and spaced about 34 inches on centers. Ends of standing seams shall be folded back at an angle of about 45 degrees. Front edge of copper shall extend down over and lock into edge strip.

rear edge of coping covering on low parapets, where base flashing extends to top of parapet • Shall be locked into base flashing with ¾ inch loose locked seam. Where base flashing does not extend to top of coping, rear edge of coping covering shall lock into edge strip as specified for the front edge.

cornice and belt course covering


20-oz cold rolled plain or lead coated (Leadtex 15) copper
2" wide copper cleats 24" o/c
Revere 16-oz. copper thru-wall flashing
2" wide loose lock expansion joint 32' apart
¾" wide loose lock seam
24-oz cold rolled copper edge strip

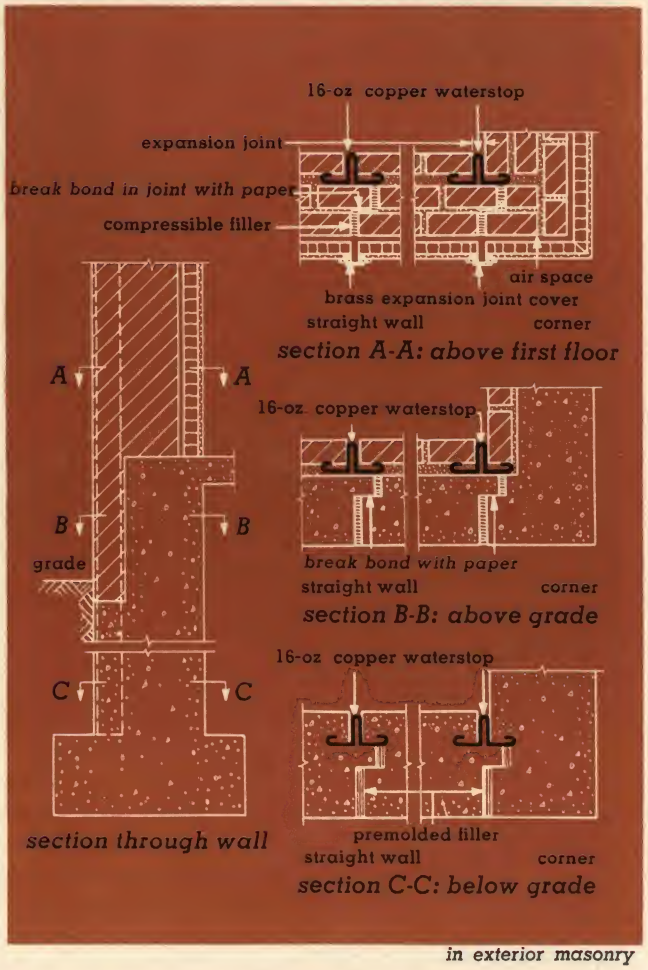
general • Top surface of projecting cornices and belt courses shall be covered with copper, locked into a previously placed cold rolled copper edge strip at outer edge of cornice or belt course and turned up on wall to form base flashing at rear edge. On wood cornices, edge strip shall be 24 ounce copper and shall be attached with copper nails spaced 4 inches apart. On stone cornices and belt courses, edge strip shall be 32 ounce copper, fastened with brass screws and expansion shields spaced 12 inches apart.

standing seam copper covering • Shall be 16 ounce cold rolled copper, with the standing seams transverse with the face of the building and spaced not more than 34 inches on centers. Front ends of the standing seams shall be folded back at an angle of about 45 degrees; rear ends shall be flattened and turned up on wall.

flat sheet copper covering • Shall be 20 ounce cold rolled copper with ¾ inch locked and soldered cross seams, except there shall be a 2 inch loose locked joint, filled with elastic cement, at intervals of not more than 32 feet and an additional 2 inch loose locked joint shall be placed not more than 8 feet from an external or internal corner. The 2 inch loose locked joint shall be as specified under Cross Folded Loose Seams.

thru-wall flashing • Shall be installed in the wall about 6 inches above the top of the cornice or belt course. Cap flashing shall be connected to the thru-wall flashing and extend down over the base flashing.

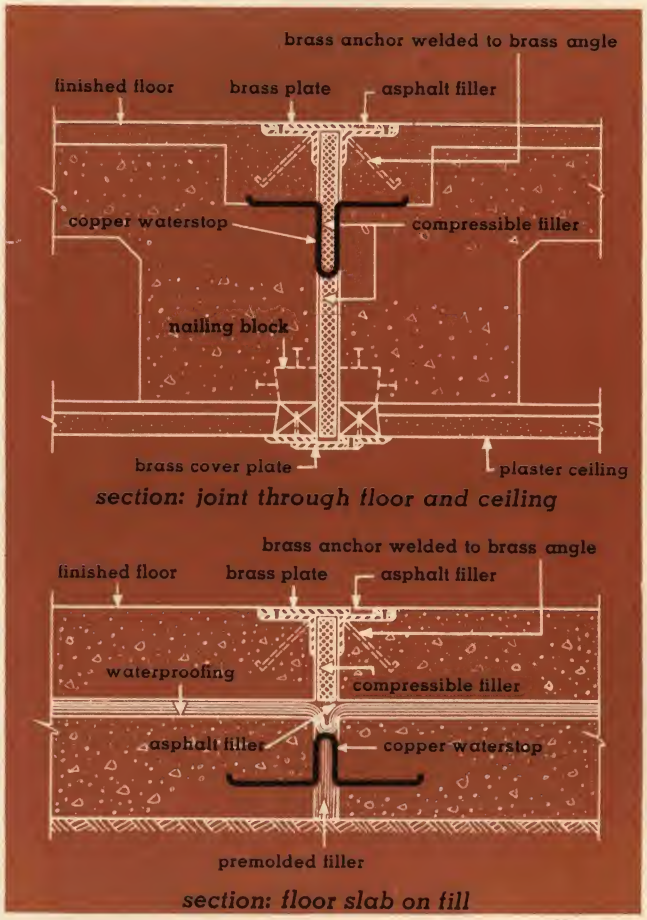
expansion joints



in exterior masonry

exterior walls • Copper expansion folds shall be installed in exterior masonry walls where indicated on the drawings. The units shall be formed of 16 ounce soft copper in 8 foot lengths and shall run continuously from top of footing to top of wall. Joints shall lap 4 inches in the direction of flow and where they occur below grade the joints shall be soldered. Each flange of the unit shall be built into the masonry not less than 4 inches. The units shall be folded from copper 16 inches wide and shall be in the form of a T with a 3¾ inch stem and with 4 inch wings. Each wing shall have a ¼ inch folded edge.

roof • Expansion joints shall be formed on flat roofs as indicated on the drawing. Roof curbs shall be covered with 20 ounce soft copper bent to form a V ridge at the center and shall be locked into top edge of base flashing which shall be provided with copper cleats spaced 12 inches on centers. The 20 ounce V ridge copper cover strip shall extend up on roof side of parapet to underside of coping, shall extend across top of coping with the V ridge in a coping joint and down on front side of parapet where it shall connect with the expansion fold in the exterior face of wall.



section: joint through floor and ceiling

section: floor slab on fill

in slabs

The edges of the V cover where it extends up on the roof side of parapet and over top of parapet shall lock into 16 ounce soft copper cap strips approximately 6 inches wide. The outer edge of cap strips on roof side of parapet shall lock into 16 ounce soft copper lock strips which shall extend into the masonry 4 inches and terminate in a bent edge for anchorage.

Soldering shall be done where required to provide watertight joints.

floors • Where expansion joints occur in floors, a 16 ounce soft copper water stop shall be provided as shown. Copper shall extend into concrete 3 inches on each side of expansion joint and shall have a loop at joint to provide for expansion and contraction.

Joint at finished floor level shall be covered with a slip joint formed of brass angles and brass plates, and shall be anchored to concrete with ¼ inch brass anchors 2 inches long, brazed to brass angles and spaced 12 inches on centers. Angles and plates shall be of design and dimensions shown on drawings.*

interior walls and ceilings • Expansion joints on walls and ceilings shall be as detailed.

sizes and weights of Revere Standard Copper

SHEETS

Roofing Temper and Cornice Temper are available in the following sizes and weights:

size and weight	estimated lbs. per sheet	size and weight	estimated lbs. per sheet
14 oz. 24″ x 96″	14	**20 oz.** 24″ x 96″	20
30″ x 96″	17½	30″ x 96″	25
36″ x 96″	21	36″ x 96″	30
16 oz. 24″ x 96″*	16	**24 oz.** 24″ x 96″	24
30″ x 96″*	20	30″ x 96″	30
36″ x 96″*	24	36″ x 96″	36
18 oz. 24″ x 96″	18	**32 oz.** 24″ x 96″	32
30″ x 96″	22½	30″ x 96″	40
36″ x 96″	27	36″ x 96″	48

STRIP COPPER

(Roofing Temper) — all 20″ x 96″

weight	estimated lbs.	weight	estimated lbs.
14 oz.	11⅔	20 oz.	16⅔
16 oz.*	13⅓	24 oz.	20
18 oz.	15	32 oz.	26⅔

(Cornice Temper) — all 96″ long.

weight	width	estimated lbs.	weight	width	estimated lbs.
14 oz.	20″	11⅔	16 oz.	14″	9⅓
16 oz.	10″	6⅔	16 oz.	15″	10
16 oz.	12″	8	16 oz.*	20″	13⅓

The following weights all 20″ x 96″ long.

weight	estimated lbs.	weight	estimated lbs.
18 oz.	15	24 oz.	20
20 oz.	16⅔	32 oz.	26⅔

Parallel Edge Strip Copper (Stamped "Revere Standard 16 oz.") Cornice Temper furnished in exact lengths of 120″ to 124″ only; in widths from over 6″ to 19½″ inclusive.

ROLLS

Roofing Temper.

16 oz. width only — 6″, 7″, 8″, 10″, 12″, 14″, 16″, 18″, 20″.

10 oz. Roofing (one size only) 16″ x 72″ — 5 lbs. per sheet.

*also made 120″ long.

Revere Advisory Service — Architectural

To cooperate with architects, engineers and contractors in construction problems involving the application of its building products, Revere inaugurated its Technical Advisory Service — Architectural. This Service is staffed by competent men thoroughly conversant with copper and copper-base alloys and familiar with modern construction. Their function is to work directly with architect, engineer or contractor; to study problems relating to metals; and to submit to Revere Research Department major problems requiring scientific study. These advisors deal with concrete problems of immediate concern. For specific information about this Service, contact the Revere office in your locality.

Revere Copper and Brass Incorporated

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